POLARIMETRY OF COMET C/1995 01 HALE-BOPP AT SMALL PHASE ANGLES. N. N. Kiselev, K. N. Kiselev, D. F. Lupishko, and Yu. N. Krugly, Astronomical Observatory of Kharkov University, Kharkov 310022, Ukraine.

The phase dependences of polarization are usually used for the study of the cometary dust particle properties. It is rather common that the P vs. α dependence is obtained over a long time while the heliocentric distance of a comet may change significantly. Because of this, variation of physical properties of dust (e.g., a mean size, size distribution) may be expected. For example, more dust particles might release from a cometary nucleus at large distances from the Sun. That is exactly just what was suggested for the explanation of the deeper polarization minima P_{min} of Comet P/Ashbrook-Jackson 1978 XIV and Chernykh 1978 IV [1]. Therefore, the appearance of bright Comet C/1995 01 Hale-Bopp at large heliocentric distance presented a good opportunity to check this effect.

Polarimetry of Comet Hale-Bopp was conducted with the 70-cm reflector (f/16) of Kharkov University Observatory from June 18 to August 10, 1996. The comet was observed with the narrow-band 6840/90 Å comet filter and with the wide-band 7228/1140 Å filter. The diaphragm was 88 arc sec. The phase angles of the comet were changing in the interval 48–13.0°. The heliocentric and geocentric distances were in the intervals 4.04–3.47 and 3.08–2.74 AU respectively.

The polarization data for Comet Hale-Bopp are shown in Fig. 1. The relevant degree of polarization of Comet P/Halley 1986 III is also presented there. These data were obtained with the wide-band 68.55/1080 Å filter at the heliocentric distances of the comet between 1.87 and 1.61 AU [2]. As can be seen, the polarization of Comet Hale-Bopp is in good agreement with the data for Comet P/Halley at the same phase angles. It should be remembered that the near-constant wavelength dependence of polarization of the comets at small phase angles [2] permits us to do this comparison in spite of the filter difference. It means that some characteristics of the dust particles of both comets are similar. However, Comet Hale-Bopp was at the heliocentric distance twice as large as those of Comet P/Halley. Why didn't this fact have an effect on the degree of polarization? At present it is assumed that the polarization is essentially controlled by the large and very rough particles at small phase angles [1]. It is probably just the texture of such particles that produces the same polarization degree though its mean size may change with heliocentric distance. The distinctions of P_{min} of different taxonomic classes of asteroids suggest that a composition of dust material (complex refractive index) also controls the depth of the negative branch of polarization. In such a case, both the texture and the composition of the particles of Comet Hale-Bopp and Comet P/Halley should be similar.

Conclusion: Polarimetry of Comet Hale-Bopp was carried out at phase angles of 4.8°–13.0°. We did not find any difference in the polarization degree of Comet Hale-Bopp and Comet P/Halley at small phase angles despite the fact that the heliocentric distances of comets were about 3.8 and 1.7 AU respectively. It is possible that the texture and dust composition efficiently controlling the negative branch of polarization are similar for both comets. The size of cometary dust particles even if it is changing with the heliocentric distance does not play the main role in the formation of the negative polarization.

References: [1] Dollfus A. (1989) *Astron. Astrophys., 213,* 469. [2] Chernova G. P. et al (1993) *Icarus, 103,* 144.

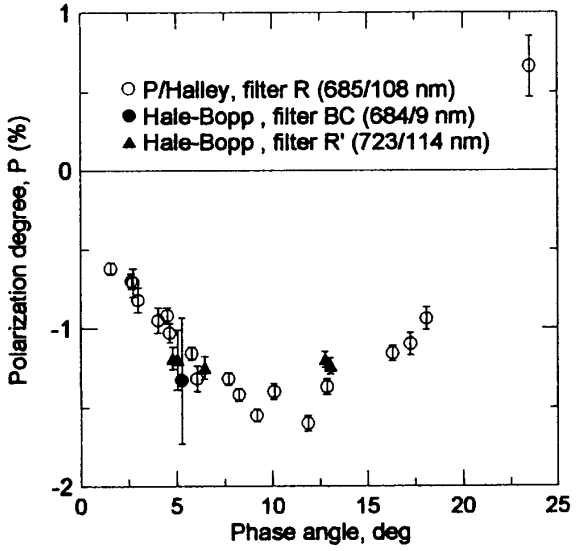

Fig. 1. The negative branch of the polarization curve for Comet Hale-Bopp and for Comet Halley.